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**Improving Consistency of
Performance Assessments in the USDOE Complex - 9171**

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ABSTRACT

The low-level waste (LLW) performance assessment (PA) process has been traditionally focused on disposal facilities at a few United States Department of Energy (USDOE) sites and commercial disposal facilities. In recent years, there has been a dramatic increase in the scope of the use of PA-like modeling approaches, involving multiple activities, facilities, contractors and regulators. The scope now includes, for example:

- National Environmental Policy Act (NEPA) assessments,
- CERCLA disposal cells,
- Waste Determinations and High-Level Waste (HLW) Closure activities,
- Potential on-site disposal of Transuranic (TRU) waste, and
- In-situ decommissioning (including potential use of existing facilities for disposal).

The dramatic increase in the variety of activities requiring more detailed modeling has resulted in a similar increase in the potential for inconsistency in approaches both at a site and complex-wide scale. This paper includes a summary of USDOE Environmental Management (EM) sponsored initiatives and activities for improved consistency. New initiatives entitled the Performance Assessment Community of Practice and Performance Assessment Assistance Team are also introduced.

INTRODUCTION

The PA process is a fundamental risk assessment tool used by the USDOE that helps provide the basis for waste management and cleanup decisions. There are a number of technical and administrative factors at a given site, and between different sites, that lead to challenges to

obtaining some level of consistency. For example, some of these administrative and technical challenges include:

- Low-Level Waste Disposal Facility Federal Review Group (LFRG) has been chartered to provide “back-end” reviews of PAs and does not have mandate to provide assistance early in the process;
- Increased use of detailed PA-like modeling in cases that involve multiple regulators, who may have preferences for certain models, approaches or scenarios;
- PA efforts are sometimes distributed between multiple contractors and USDOE Offices at a given site;
- Source term modeling approaches can have legitimate differences in waste forms (e.g., K_d s, release rates) and among barriers (e.g., containers, concrete); and
- Geology, hydrology, and geochemistry can vary at a given site.

Inconsistencies in PA approaches, including conceptual models and parameterization, within a given site, and potentially across the USDOE Complex can lead to questions about the validity of the process. Furthermore, PAs are one of many environmental evaluations carried out as part of DOE activities, including those under NEPA, RCRA and CERCLA. Thus, consistent approaches within sites, between sites and between assessments carried out under different regulatory regimes and DOE orders is important for quality control and achieving broader public and regulatory confidence. It is important to note that the use of consistent approaches is not meant to imply uniformity; however, there is a need to work towards: (1) consistency in approach, to improve transparency for DOE stakeholders and (2) comparability to support identification of most appropriate practices for each application. Similarly, there is a need to share information regarding advances in approaches and promote the use of best practices. USDOE-EM is in the process of implementing a number of activities with the goal of improving coordination (including consistency and application of best practices) for PA, composite analysis (CA) and risk assessment efforts. PA is used to represent modeling for a variety of purposes in this paper.

CURRENT INITIATIVES

USDOE EM Regulatory Compliance (EM-10), through the LFRG, and USDOE EM Engineering and Technology (EM-20) are taking a proactive approach to address challenges to PA consistency. Many of these activities have been implemented previously via the LFRG in an *ad hoc* manner as time and resources permit. Table I includes examples of technical and administrative actions that have been taken to address consistency.

In addition to the activities summarized in Table I, other actions have been taken to improve communication between those involved in PA activities through the use of routine conference calls involving a summary of key activities that are underway and discussions of issues that are being addressed. Lessons learned sessions are also included during the Semi-Annual LFRG Business Meetings. Further, the issues associated with PA consistency have been briefed to the DOE-EM High-Level Waste Corporate Board and have attracted the attention of senior management.

TABLE I. Initiatives to Improve Consistency

| Administrative | Technical |
|---|---|
| <ul style="list-style-type: none"> • Specific LFRG PA Review Criteria added to address consistency | <ul style="list-style-type: none"> • Probabilistic Sensitivity and Uncertainty Analysis Workshop [1] |
| <ul style="list-style-type: none"> • LFRG Member Qualifications | <ul style="list-style-type: none"> • Workshop on Development of Input Distributions |
| <ul style="list-style-type: none"> • Proposed updates to DOE Order 435.1, manuals and guides | <ul style="list-style-type: none"> • Workshop on Monitoring Activities |
| <ul style="list-style-type: none"> • DOE-NA involvement in LFRG review and approvals | <ul style="list-style-type: none"> • EM-11 and EM-23 cooperation on In-Situ Decommissioning |
| <ul style="list-style-type: none"> • Increasing Technical Staff involvement in LFRG PA reviews | <ul style="list-style-type: none"> • EM-11 and EM-21 cooperation on Cementitious Barriers |

FUTURE INITIATIVES

As discussed above, a number of technical activities have already been initiated to help improve the consistency of PA approaches being applied across the USDOE Complex and within individual USDOE sites. In the course of completing activities to date and recognizing the challenges to consistency, recommendations for further improvements have been identified. These recommendations are targeted at complex-wide technical initiatives and also site-specific activities. The approaches for obtaining improvements can be summarized as follows, emphasizing close collaboration between EM-10 and EM-20:

- Establishing a joint sub-committee of the HLW and LLW Corporate Boards to provide *strategic guidance* on PA and CA with the goal of gaining input from a wide range of stakeholders (USDOE sites, National Laboratories, state and federal regulators and oversight organizations, advisory boards, academia) on the key issues and areas for improvement, best practices and approaches to improving consistency amongst PAs and other risk assessments.
- Organize a broad-based Community of Practice (CoP) for performance assessment that can assist in providing expertise, identifying lessons learned, and advertising best practices.
- Drawing from the CoP, Performance Assessment Assistance Teams (PAATs) will be formed to provide the foundation and guidance for up-front consistency and quality across sites during PA development and maintenance.
- Use Site-specific Consistency Groups in conjunction with the PAAT and CoP to provide consistency in assumptions across various environmental assessments at individual sites.
- Use the LFRG to provide final PA review.

The current LFRG review process is targeted at the back-end when the PA is complete. Similar to the concept that you should not attempt to inspect quality into a product, there is a need for a method to address PA consistency early in the PA process. The LFRG has been

attempting to expand its role on an *ad hoc* basis to provide a broader level of support, but the LFRG is not intended to serve that role. Thus, the first recommendation is to refocus the LFRG on its original mission and create a new and separate means to formally provide support earlier in the PA process.

As discussed above, there are many types of analyses being done at USDOE Sites (e.g., NEPA, CERCLA, D&D, etc.) and these analyses may be managed by different contractors and even USDOE Offices at a given site. The broad scope of these activities creates a situation where there is significant potential for inconsistency. The second recommendation is to develop a means to foster early and sustained communication among those conducting the wide variety of analyses at a given site. The concept of a Groundwater Modeling Consistency Team has served as a good model to improve communication at the Savannah River Site. The LFRG has recommended that other sites consider forming similar teams. Forming such teams will be a challenge at sites involving multiple contractors and DOE Offices.

EM-20 sponsors a number of applied research and development activities directed at USDOE Complex-wide needs. EM-20 can also serve as a technical resource to foster continuous improvement of tools that support PA applications. It is recommended to develop a more formal link between the needs of EM-10 and the activities being conducted in EM-20.

PERFORMANCE ASSESSMENT ASSISTANCE TEAM AND COMMUNITY OF PRACTICE

In order to address the recommendations and challenges described above, EM-10 and EM-20 are working together to form PAATs and a CoP. A number of potential roles and ideas regarding the relationship between CoP and PAAT are presented in this Section. The roles and relationships are being actively discussed and will be formalized by the joint sub-committee discussed previously. Potential missions for the CoP, and the PAATs that will be derived therefrom, include:

- 1) Reducing regulatory and technical risks related to PA implementation,
- 2) Fostering continuous improvement in the quality, credibility, consistency, and efficiency of DOE's PA and risk-based decision-making, and
- 3) Maintaining an enduring performance and risk assessment capability and knowledge base for the DOE Complex.

One important aspect is the acknowledgement of the need for enduring complex-wide and site-specific capabilities and knowledge bases for PAs and other environmental assessments. This emphasizes that the CoP and associated PAATs are not only focused on helping to improve the current situation, but are also focused on training the next generation of PA professionals and providing resources that will endure into the future.

The CoP and PAATs are proposed to be implemented with strategic guidance from a sub-committee under the High-Level Waste Corporate Board. The CoP will be formed under Federal oversight (shared between EM-10 and EM-20). The actual PAATs are anticipated to be relatively small groups with the emphasis on technical expertise, using practitioners and researchers with site-specific knowledge and experience, including representatives from USDOE Core

Laboratories and academia. The CoP is intended to be a broader, more inclusive collection of all interested practitioners that are involved with assessment activities and the PAAT(s) would be a subset of the CoP tasked to address complex-wide or site-specific needs. A core group of Subject Matter Experts with a combination of site-specific knowledge and experience with broader programs will be identified within the CoP that can be called upon to support specific issues (e.g., EM-20, Office of Science, National Laboratories, Nuclear Regulatory Commission, and International activities).

A major emphasis of the CoP and the associated PAATs is expected to be to provide USDOE Complex-wide technical support that will be beneficial early in the PA process and can help to promote improved consistency and communication. This could include assistance in meetings with regulators and stakeholders, fostering sharing of data resources, and identification of available modeling resources. For example, the CoP can foster continuous improvement through communications regarding technical information from within and outside of USDOE EM, especially sharing of research results, vetting available data and improving the use of PAs as a risk communication mechanism.

One specific item that is being promoted is the benefit of each Site developing some form of PA consistency team. All representatives for these teams would be expected to be included in the CoP. The Savannah River Site has implemented a Groundwater Modeling Consistency Team that includes representatives from the different organizations that are conducting PAs or risk assessments, which involve groundwater modeling. This team reviews all modeling activities in support of waste disposal, tank closures, CERCLA remediation, D&D, etc. Such teams facilitate communication between the different groups that may be involved in modeling at a site and provide a mechanism to build consistency across different activities. An important emphasis is for modelers to have the burden of explaining perceived inconsistencies (i.e., there may be legitimate differences, but they must be explained).

Potential Roles

Different roles have been discussed for the PAATs and CoP in the context of the goals described previously (see Table II). Notably, the emphasis is on roles that provide benefits early in the PA process. Also, it is not the intent for the PAATs and CoP to dictate specific approaches. In fact, the PAATs will have to proceed with the recognition that any activities or guidance must be consistent with contract structures at each site. In this regard, a PAAT and the CoP are intended to provide a technical forum to share experiences and make information and resources available that can help individual contractors or Sites to select approaches, models, and information they would prefer to use. Some additional discussion of potential roles is provided in the following sections.

One of the roles at the earliest stage of the PA process is expected to be to provide assistance with interactions with regulators and efforts to scope PA work to be conducted. Effective scoping with the regulators and other stakeholders at the beginning has proven to improve the efficiency of the PA process. There may also be some benefit to developing a standard template for basic steps in a scoping process.

TABLE II. Potential CoP/PAAT Roles

| |
|---|
| Provide On-Site Scoping Assistance on new PAs |
| Develop Example Template for Scoping PAs |
| Participate on Modeling Consistency Groups |
| Compile Information on Existing Guidance Related to Assessments |
| Develop Guidance/Provide Support on Specific Technical Topics |
| Provide Workshops and Lessons Learned Forums |
| Provide Training and Experience for Next Generation of PA Professionals |
| Develop Structured Repository of Data, Research Results and Modeling Approaches |
| Maintain a Roster of Subject Matter Experts |

Modeling consistency groups were discussed in the previous section. A potential role for a PAAT would be to provide expertise to participate on or help with the formation of a consistency group at a given site. The CoP can also help with the development of consistency team expectations complex-wide. Experience from similar activities at another site could be transferred in this manner.

A key activity for a PAAT is expected to be to provide guidance and technical support in specific areas as needed for a given PA. A PAAT can serve as a resource from which individual sites can obtain technical resources to provide advice on specific topics. The CoP will also serve as a vehicle to develop detailed guidance in specific areas where guidance is deemed to be a complex-wide need.

Workshops and lessons learned forums have been conducted within the LFRG scope in recent years. For example, workshops on probabilistic sensitivity and uncertainty analysis, development of input distributions, and performance monitoring have been held in 2008. Lessons learned forums have also been held in 2008 on implementation of 3116 and tank closure and LFRG activities in general. These activities are appropriate for the CoP and a PAAT as they are actually beyond the scope of the LFRG.

An important goal for the CoP is to foster an enduring PA resource. This resource is envisioned as being two pronged: training of the next generation of PA professionals and also development of a structured repository of data, models and research results that reflects information gained through links to activities for USDOE Complex PAs and associated research, USNRC research, Office of Science research, International activities, etc.

CONCLUSIONS

The use of more detailed PA type modeling has expanded significantly in the last 5 to 10 years. This expansion has involved additional regulators, multiple organizations at a given site, and the use of multiple modeling approaches at individual sites. This has created an environment with risks for inconsistency and potential loss of credibility. The USDOE has recognized the need to

take action to address this potential for inconsistency and to promote means to mitigate the concern.

The LFRG has implemented a number of administrative and technical activities to address consistency. For example, three workshops and two lessons learned forums have been conducted in 2008. Joint activities with EM-20 have also been initiated. From the LFRG perspective, all of these activities have largely been conducted on an *ad hoc* basis and are outside the scope of the LFRG mandate. A need has been recognized for a separate body to devote the necessary attention to consistency.

The concept of a CoP and PAAT has been introduced to address the need for consistency early in the modeling process. The PAAT and CoP are seen as enduring technical vehicles for DOE-EM to foster continuous improvement in the PAs being conducted across the USDOE Complex. The proposed approach to move forward includes:

- Establishing a joint sub-committee of the HLW and LLW Corporate Boards to provide *strategic guidance* on PA and CA.
- Establish a broad-based CoP to provide the foundation and guidance for up-front consistency and quality across sites during PA development and maintenance.
- Use Site-specific Consistency Groups in conjunction with PAATs and the CoP to provide consistency in assumptions across various environmental assessments at individual sites.
- Use the LFRG to provide final PA review.

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